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(54) **HIGHLY AIRTIGHT GAS PUMP**

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F04B 45/027	(2006.01)
F04B 45/047	(2006.01)
F04B 45/04	(2006.01)
F04B 1/20	(2006.01)
F04B 39/10	(2006.01)

(52) **U.S. Cl.**

CPC ***F04B 43/026*** (2013.01); ***F04B 43/025*** (2013.01); ***F04B 43/04*** (2013.01); ***F04B 45/022*** (2013.01); ***F04B 45/027*** (2013.01); ***F04B 45/04*** (2013.01); ***F04B 45/043*** (2013.01); ***F04B 45/047*** (2013.01); *F04B 1/205* (2013.01); *F04B 39/1033* (2013.01)

(58) **Field of Classification Search**

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USPC 417/269, 271, 413.1, 539, 479, 531, 417/533, 566; 92/57, 71; 91/503; 137/512, 137/512.4, 512.3

See application file for complete search history.

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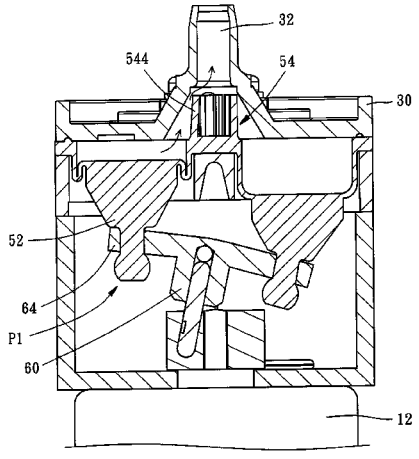
(57) **ABSTRACT**

A gas pump is composed of a gas suction member and a gas exhaust member. The gas suction member includes a gasbag having a hollow retractable portion being drivable by a motor for oppression or expansion, an intake valve allowing the air to pass therethrough when the hollow retractable portion is oppressed, and a flexible tube having two crosscuts, by which the flexible tube is divided into two vent valvular pieces. Each of the vent valvular pieces has a reinforcing strip formed on an internal wall thereof for forcing each of the vent valvular pieces to seal the exhaust passage. The gas exhaust member is mounted to the gasbag and includes a venthole and a guide slot. The venthole can receive the flexible tube therein. The guide slot communicates the hollow retractable portion and the intake valve for guiding the air into the hollow retractable portion.

5 Claims, 6 Drawing Sheets



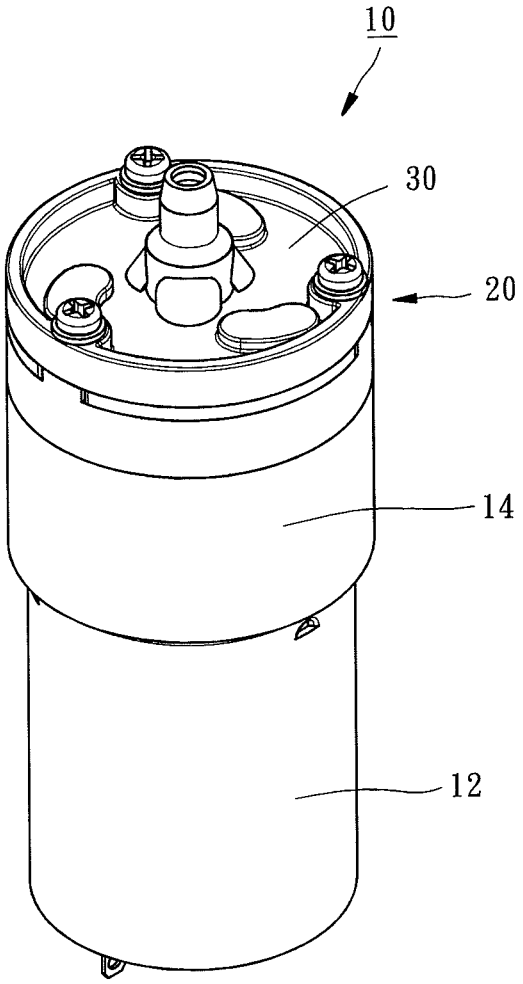


FIG. 1

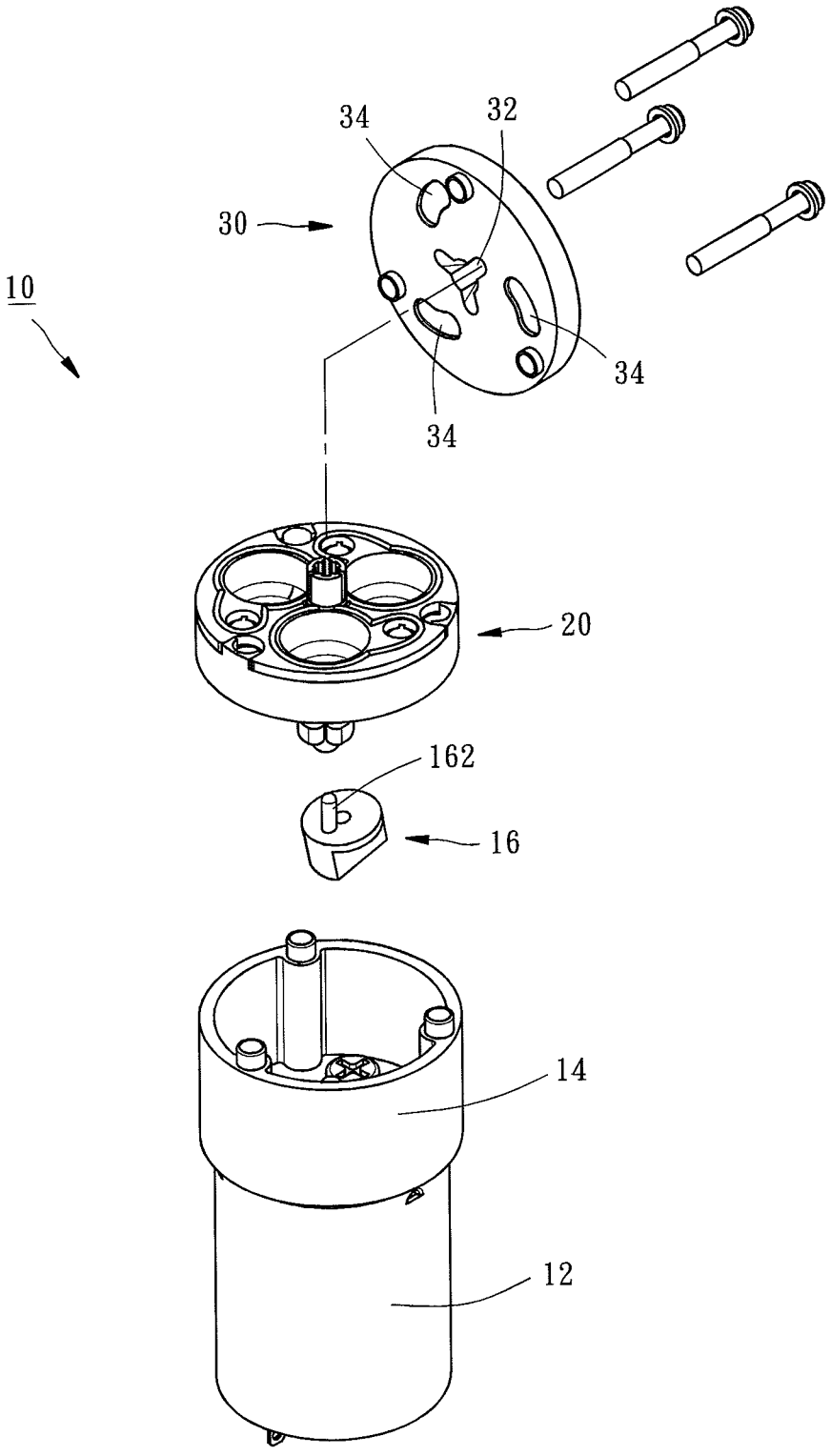


FIG. 2

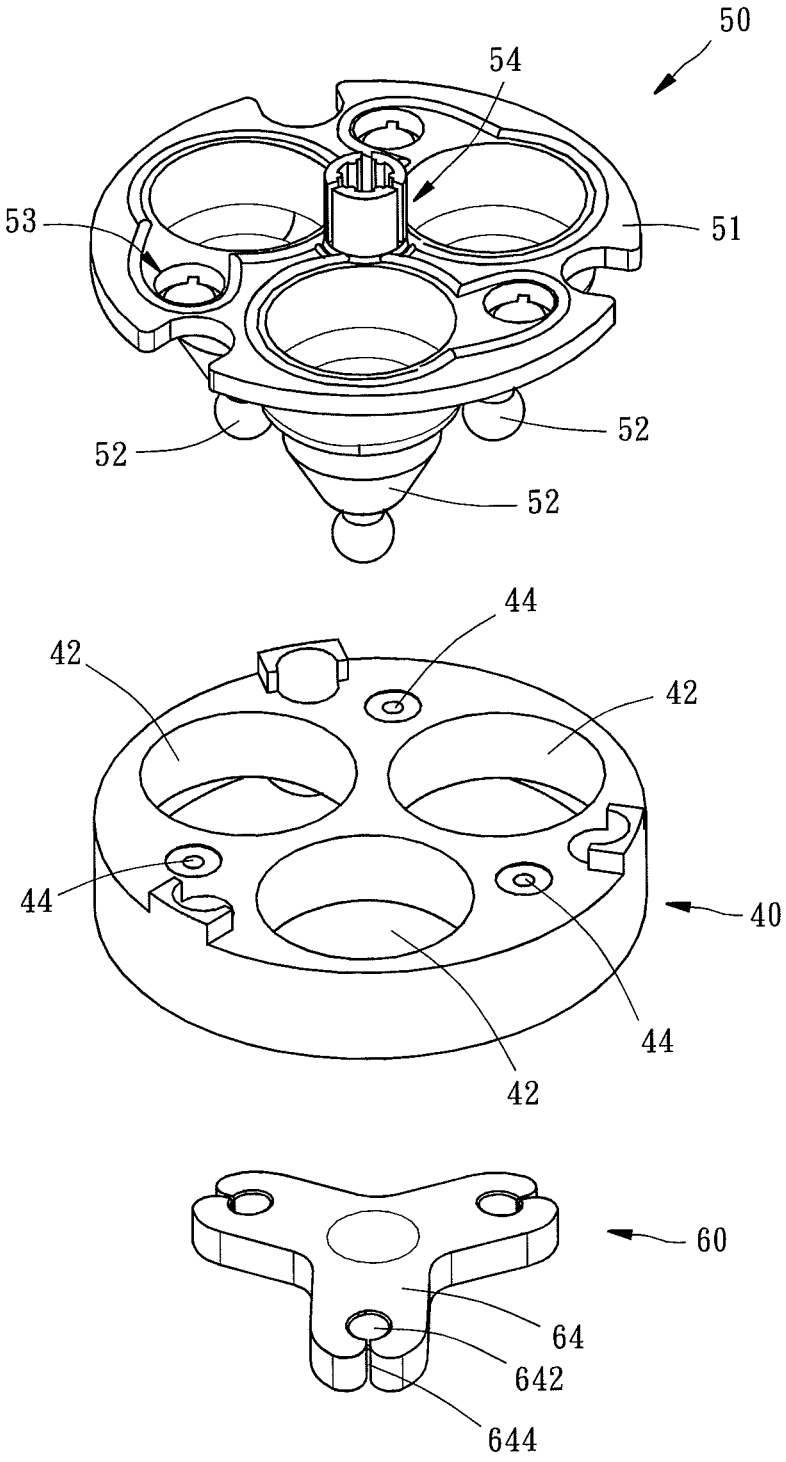


FIG. 3

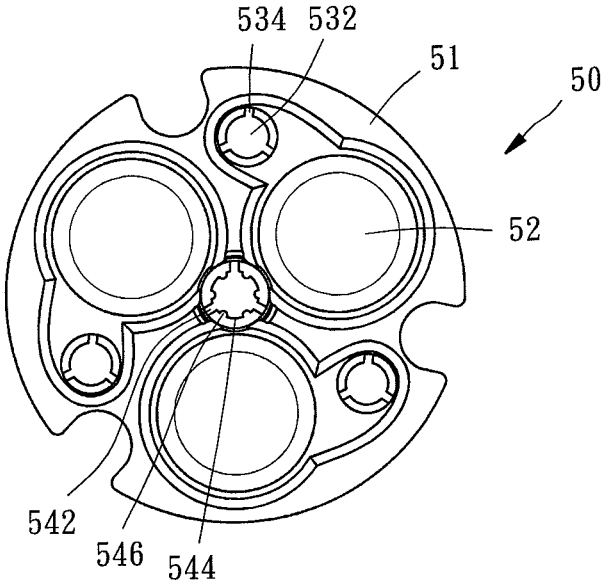


FIG. 4

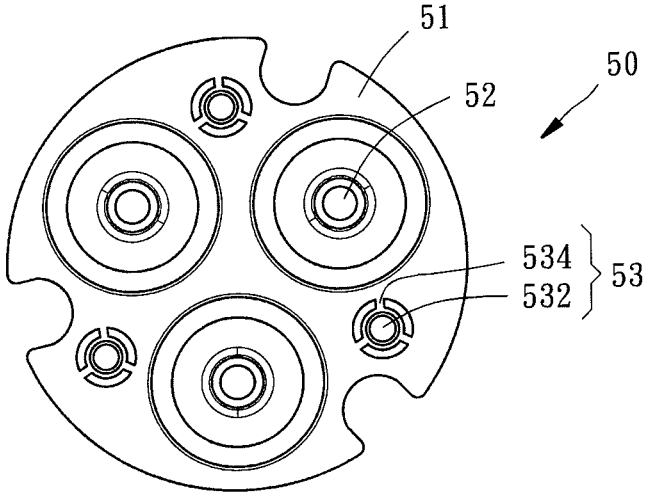


FIG. 5

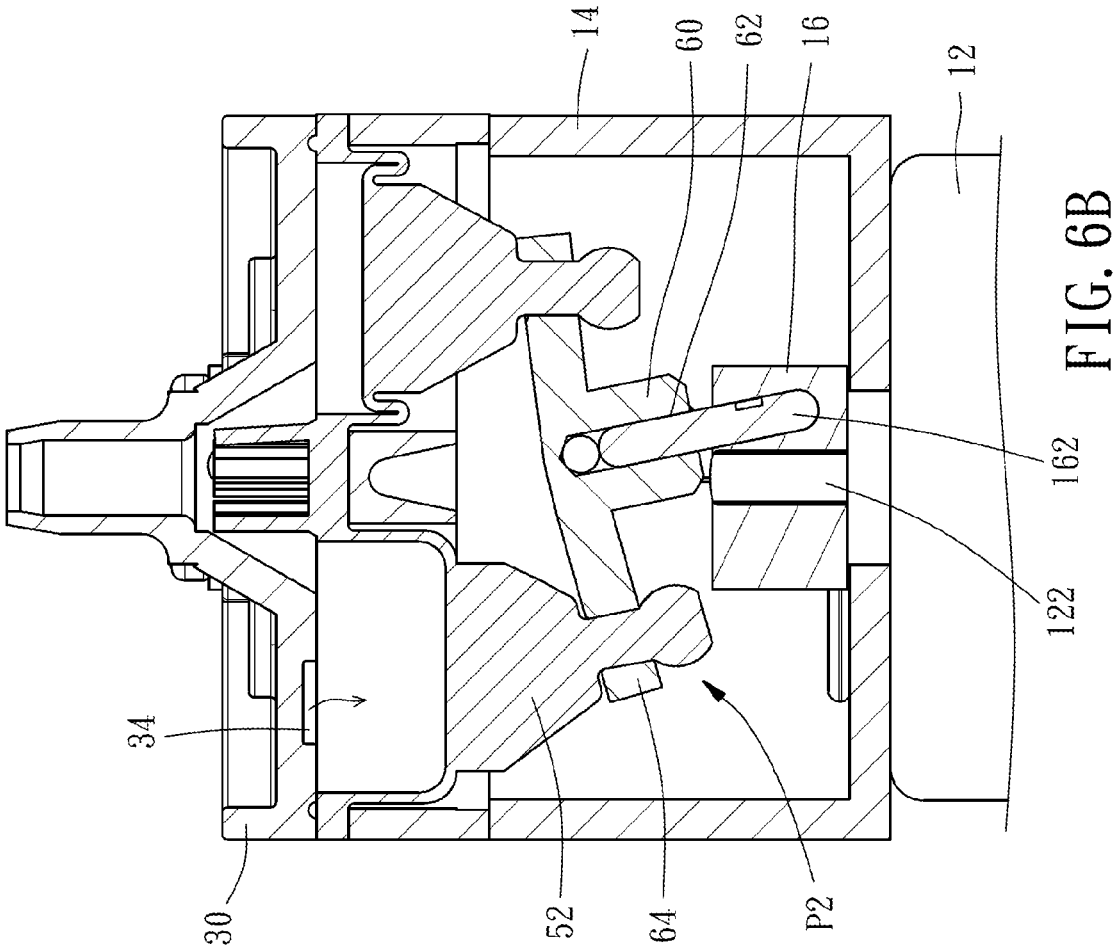


FIG. 6B

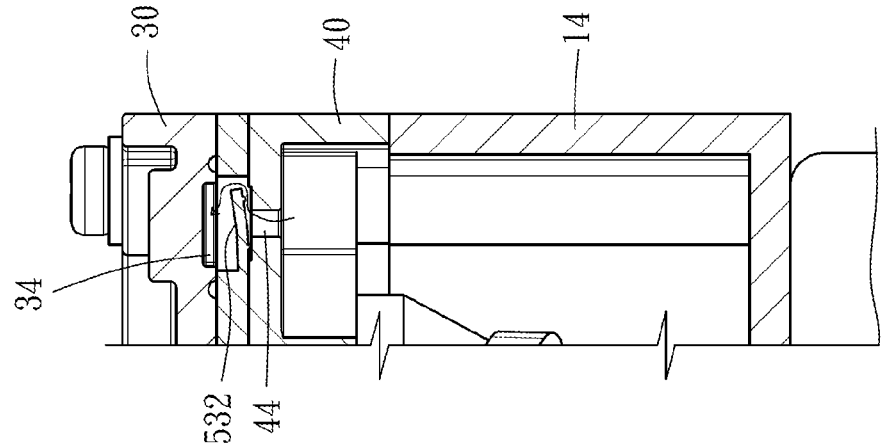


FIG. 6A

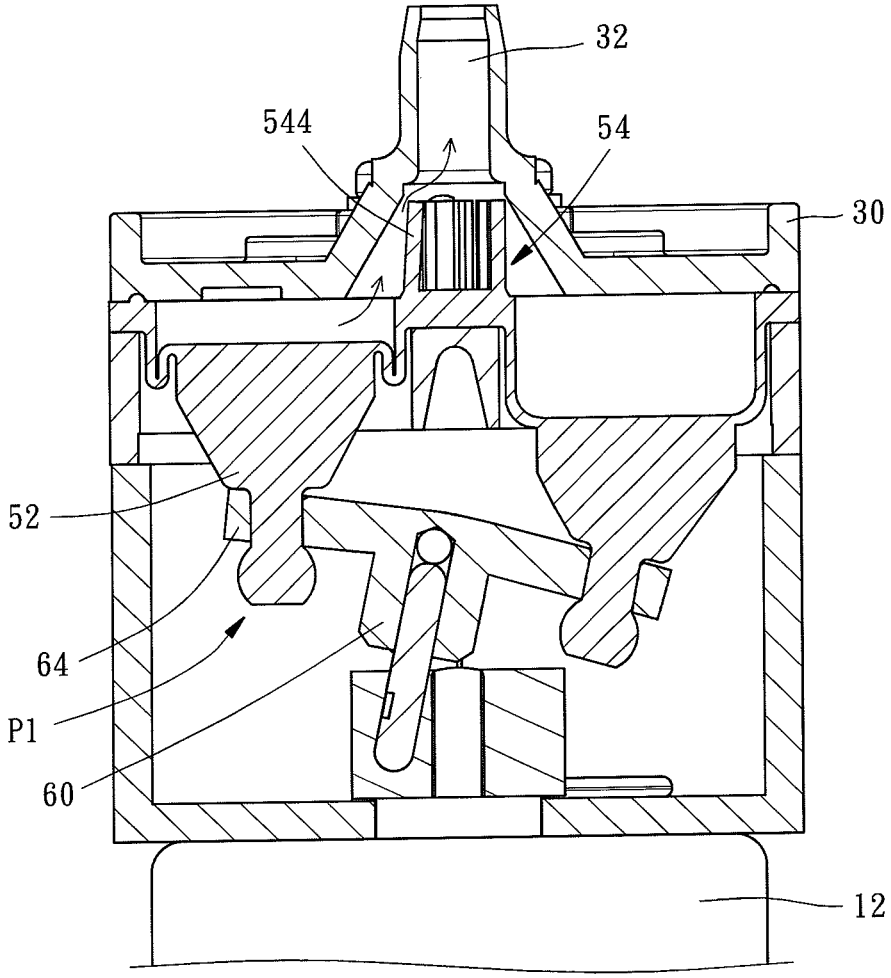


FIG. 6C

HIGHLY AIRTIGHT GAS PUMP

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a gas pump and more particularly, to a highly airtight gas pump.

2. Description of the Related Art

A conventional gas pump is composed of an outtake valve, a stopper, a gasbag assembly, a plurality of intake plug, and a control bar, controlling ascent or descent of the control bar via a motor for oppressing and inflating each gasbag of the gasbag assembly. When each gasbag is oppressed, the air is sucked into the gasbag through each inlet. When each gasbag is inflated, the air is expelled out of the gasbag through a valvular piece. In this way, the purposes of air charging and discharging can be reached.

However, in the aforesaid structure, the number of the components of the conventional gas pump are numerous and they are manufactured individually and then put together, so the assembly of those parts becomes a trouble and the parts are subject to malposition therebetween in the process of the assembly to bring adverse effect to the overall airtightness. In this way, overgreat noise may happen while the air is being charged into and discharged from the gasbags. Thus, the conventional gas pump needs further improvement.

SUMMARY OF THE INVENTION

The primary objective of the present invention is to provide a gas pump which is highly airtight, structurally simple, and convenient in assembly.

The foregoing objective of the present invention is attained by the gas pump composed of a gas suction member and a gas exhaust member. The gas suction member includes a gasbag holder and a gasbag. The gasbag holder has a receiving a hole and a pore. The gasbag is mounted to the gasbag holder and has a plate, a hollow retractable portion, an intake valve, and a flexible tube. The plate is fixed to the gasbag holder. The hollow retractable portion extends outwardly from one of two sides of the plate and is received in the receiving hole of the gasbag holder for being driven by a motor to move between an oppression position and an expansion position. The intake valve is mounted to the plate and movably covered on the pore for allowing the air to pass therethrough when the hollow retractable portion is located at the oppression position. The flexible tube is extends outwardly from the other side of the plate and includes two crosscuts, by which the flexible tube is divided into two vent valvular pieces by the two crosscuts. Each of the vent valvular pieces has a reinforcing strip formed at an internal wall thereof for forcing each of the vent valvular pieces to prevent the air from pass therethrough when the hollow retractable portion is located at the expansion position. The gas exhaust member is covered on the gasbag and includes a venthole and a guide slot. The venthole communicates with the hollow oppression portion for receiving the flexible tube therein. The guide slot is located between the hollow retractable portion and the intake valve for communication therebetween for guiding the air passing through the intake valve into the hollow retractable portion.

In light of the structure indicated above, the hollow retractable portion, the intake valve, and the flexible tube are integrated in one piece, so the whole number of the components is reduced to simplify the assembly process. Besides, the reinforcing strips ensure high airtightness for the whole structure of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a preferred embodiment of the present invention.

FIG. **2** is an exploded view of the preferred embodiment of the present invention.

FIG. **3** is an exploded view of the gas suction member of the preferred embodiment of the present invention.

FIG. **4** is a top view of the gasbag of the preferred embodiment of the present invention.

FIG. **5** is a bottom view of the gasbag of the preferred embodiment of the present invention.

FIG. **6**A is a sectional view of a part of the preferred embodiment of the present invention, illustrating that the air passes through the intake valve.

FIGS. **6**B and **6**C each are a sectional view of he preferred embodiment of the present invention, illustrating the status of the airflow.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

A preferred embedment of the present invention is provided in the following paragraphs accompanied with the drawings to describe and illustrate the structure, technical features, and effects of the present invention recited as follows.

Referring to FIGS. **1-2**, a gas pump **10** constructed according to a preferred embodiment of the present invention can be driven by a motor **12** for gas charging and discharging. The motor **12** is fixed to a motor holder **14** and includes a rotary shaft **12**, as shown in FIG. **6**B. The rotary shaft **122** is sleeved with a swivel member **16** having an eccentric shaft **162** arranged slantingly. The gas pump **10** of the present invention is composed of a gas suction member **20** and a gas exhaust member **30**. The detailed descriptions and operations of these elements as well as their interrelation are recited in the respective paragraphs as follows.

Referring to FIGS. **3-5**, the gas suction member **20** is formed of a gasbag holder **40**, a gasbag **50**, and a pressure control bar **60**. The gasbag holder **40** includes three receiving holes **42** and three pores **44**, all of which are arranged alternately. The gasbag **50** has a plate **51**, three hollow retractable portions **52**, three intake valves **53**, and a flexible tube **54**. The plate **51** is fixed to a top side of the gasbag holder **40**. Each of the hollow retractable portions **52** extends outwardly from a bottom side of the plate **51** and is received in one of the receiving holes **42**. Each of the intake valves **53** includes a valvular member **532** and three connection strips **534**. Each of the valvular members **532** covers one of the pores **44**. Each of the connection strips **534** is connected between the plate **51** and the valvular member **532**. The flexible member **54** extends outwardly from a top side of the plate **51** and includes three crosscuts **542** in such a way that the flexible member **54** is divided into three vent valvular pieces **544** by the three crosscuts **542**. Each of the vent valvular pieces **544** includes two reinforcing strips **546** formed on an internal wall thereof. The pressure control bar **60** includes an insertion hole **62** formed at a center of a bottom side thereof for insertion of the eccentric shaft **162** therein. Besides, the pressure control bar **60** includes three grappling portions **64**, each of which has a retaining hole **642** and an access gap **644** in communication with the retaining hole **642**. In assembly, respective bottom ends of the hollow retractable portions **52** can pass through the access gaps **644** to be held inside the retaining hole **642**.

The gas exhaust member **30** is fixed onto the top side of the plate **51** and includes a venthole **32** and three guide slots **34**.

The venthole **32** communicates with each of the hollow retractable portions **52** for receiving the flexible tube **54** therein. Each of the guide slots **34** communicates with the adjacent hollow retractable portion **52** and the adjacent intake valve **53** for guiding the air passing through the intake valves **53** into the hollow retractable portions **52**.

When it is intended to operate the gas pump **10**, the operational process of each hollow retractable portion **52** of the gasbag **50** is identical of the other hollow retractable portions **52**, so only one hollow retractable portion **52** is illustrated for its operational process as an example to prevent the whole specification from redundancy. First, the motor **12** can drive rotation of the swivel member **16**. Next, the swivel member **16** can force the grappling portion **64** via the eccentric shaft **162** to rise or drop for linking-up with the hollow retractable portion **52** in such a way that the hollow retractable portion **52** is movable between an oppression position P**1** and an expansion position P**2**. When the hollow retractable portion **52** is located at the expansion position P**2**, the air inside the motor holder **14** can be sucked to pass through the pore **44** and then push the valvular members **532** to enter the guide slot **34**, as shown in FIG. **6**A, and finally enter the hollow retractable portion **52** from the guide slot **34**, as shown in FIG. **6**B, in such a way that the hollow retractable portion **52** starts with air charging. When the motor **12** keeps working, the hollow retractable portion **52** is oppressed by the grappling portion **64** to move to the oppression position P**1**, as shown in FIG. **6**C. In the meantime, the air inside the hollow retractable portion **52** is oppressed to push the vent valvular piece **544** to exhaust through the venthole **32**. Once the air exhaust is completed, the vent valvular pieces **544** can be forced by the reinforcing strips **546** to return to the original position to prevent the air from passing therethrough. In this way, the motor **12** keeps working to drive the hollow retractable portion **52** to keep on air charging and discharging.

In conclusion, the gas pump **10** of the present invention integrates the hollow retractable portions **52**, the intake valves **53**, and the flexible tube **54** as a whole, so the whole number of the components of the gas pump is reduced to simplify the assembly process. Besides, the connection strips **534** and the reinforcing strips **546** enable the intake valves **53** and the vent valvular pieces **544** to secure high airtightness.

Although the present invention has been described with respect to a specific preferred embodiment thereof, it is in no way limited to the specifics of the illustrated structures but changes and modifications may be made within the scope of the appended claims.

What is claimed is:

1. A highly airtight gas pump, which can be driven by a motor for gas charging and discharging, the gas pump comprising:

a gas suction member having a gasbag holder and a gasbag, the gasbag holder having a receiving hole and a pore, the gasbag having a plate, a hollow retractable portion, an intake valve, and a flexible tube, the plate being fixed to the gasbag holder, the hollow retractable portion extending outwardly from one of two sides of the plate and received in the receiving hole of the airbag holder for being driven by the motor to move between an oppression position and an expansion position, the intake valve being mounted to the plate and movably covering the pore of the gasbag holder, the flexible tube extending outwardly from the other side of the plate and having at least two crosscuts, the flexible tube being divided into at least two vent valvular pieces by the two crosscuts, each of the vent valvular pieces having a reinforcing strip formed on an internal wall thereof and being movable inwardly by the air inside the hollow retractable portion; and

a gas exhaust member covered on the gasbag of the gas suction member and having a venthole and a guide slot, the venthole communicating with the hollow retractable portion for receiving the flexible tube therein, the guide slot communicating with the hollow retractable portion and the intake valve, the guide slot being used for guiding the air inside the intake valve into the hollow retractable portion.

2. The highly airtight gas pump as defined in claim **1**, wherein the gas suction member further comprises a pressure control bar, wherein the pressure control bar is connected with the hollow retractable portion of the gasbag and can be driven by the motor to force the hollow retractable portion of the gasbag to move between the oppression position and the expansion position.

3. The highly airtight gas pump as defined in claim **2**, wherein the pressure control bar comprises a grappling portion, the grappling portion having a retaining hole and an access gap in communication with the retaining hole; a bottom end of the hollow retractable portion of the gasbag passes through the access gap to be held inside the retaining hole.

4. The highly airtight gas pump as defined in claim **1**, wherein the intake valve of the gasbag comprises a valvular member and at least two connection strips, the valvular member covering the pore of the gasbag holder, each of the connection strips being connected between the plate and the valvular member.

5. The highly airtight gas pump as defined in claim **4**, wherein the intake valve of the gasbag comprises three said connection strips circularly arranged around the intake valve.

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